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Statement of

James E. Webb
Administrator

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

before the

Subcommittee on Independent Offices
Committee on Appropriations
United States Senate

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to appear before you once again to discuss the budget requirements of NASA.

Before I address myself to the details of our budget request, I would like to emphasize briefly five key aspects of our situation as it has developed in the year since we last appeared before you. Some of these are matters which I will discuss in greater detail later in my statement but a quick overview will, I believe, help place the details in perspective.

First - Our program during the past year, viewed as a whole, has had a high degree of success. Seventy-six percent of our space launches have been successful in achieving all of their primary objectives; many others succeeded in achieving some of their objectives. We completed successfully the Gemini program in which twenty men were successfully launched and safely returned from space.

We have now had two successful soft landings on the moon and have tested its surface by digging a small trench and by using other instruments. We have acquired clear photographs of good resolution of almost the entire front and back sides of the moon. We are taking meteorological pictures of one side of the Earth from synchronous altitudes with the ATS-1. Mariner V is on its way to Venus and we are still conducting useful successful experiments with Mariner IV as it heads back towards the Earth after a trip of one billion, three hundred million miles which has taken it past Mars and all the way back around the Sun. In aeronautics we have learned more about the sonic boom and the reduction of aircraft noise and have flown experimental lifting body shapes which may lead to more efficient ways for astronauts to return to the Earth from space. We have continued to advance technology on a broad front and have increasing evidence of the impact on the economy of technology developed in our aeronautical and space programs.

Second - We have had our first serious accident in the manned space flight program. We investigated thoroughly the circumstances, causes, and implications of the Apollo 204 fire in which three lives were lost. The report of the Apollo 204 Review Board, the actions taken by NASA in consequence thereof, and our plans for moving ahead with the program have been presented to and reviewed by the Aeronautical and Space Sciences Committee of the Senate and the Oversight Subcommittee of the House Committee on Science and Astronautics. As we have reported to both Committees, we have now reached agreement with

North American Aviation, Inc. on a basis for settlement of all outstanding issues related to both the Apollo Command and Service Module and the S-II stage contracts, and have strengthened the Apollo program by contracting with the Boeing Company for integration of the entire Saturn V-Apollo System.

The Apollo program is again moving forward; we are carefully reviewing and revising the program milestones that we expect to meet. The first unmanned launch of the Saturn V should take place early this fall. Two more unmanned Apollo launches should take place by the end of the year and the first manned launch should occur next spring. The Apollo 204 fire was a serious set-back but it has not shaken our confidence that the Saturn-Apollo system will prove capable of doing what it was intended to do. There is still some chance that we will be able to achieve a manned lunar landing by the end of this decade.

Third - Our total effort in aeronautics and space is now sharply declining. Total employment on NASA work in industry, universities, and Government reached about 420,000 in the first months of 1966. As the peak of the development effort on the Apollo program has passed and as a result of the lower budget levels approved, total employment has declined to about 330,000 by June 30, 1967. Under the budget recommended to the Congress by the President for FY 1968, it will decline further to about 290,000. Any reductions in the President's FY 1968 budget will result in an even greater decline.

The impact of this decline is being felt and will continue to be felt all over the country. We, in NASA, as well as the contractors and universities who work with us face many hard decisions in making the adjustments that are necessary.

Fourth - The Soviet Union has continued a strong and active program in both space and aeronautics. They have shown that they are developing a new manned space capsule, and although its first manned flight ended in tragedy the indications are clear that they are making a major effort to forge ahead in manned space flight. They have launched their third Proton satellite, weighing 27,000 pounds, and their third and fourth Molnyia communications satellites. They achieved the first soft landing on the moon and placed three vehicles in lunar orbit. Their Cosmos program has continued at a high rate with thirty-four launches in 1966 and thirty-one so far this year. They, too, have a spacecraft -- much larger than ours -- on the way to Venus. At the Moscow air show earlier this year, they displayed to the world several new advanced types of aircraft, showing that they are pressing forward in aeronautics as well as in space.

Fifth - The development of perhaps the most significance for the future has been the fact that basic decisions have been arrived at after careful deliberation and are reflected in the President's FY 1968 budget recommendations, on the course the space program should follow in the post-Apollo period. I will discuss the details later, but the key point is that the President and his principal scientific

and budgetary advisors have concluded that it is essential in the national interest that we take the steps in FY 1968 that are necessary to assure the continuation of a strong space program after the manned lunar landing objective is achieved. These decisions have placed before the Congress a program directed at selected important objectives -- a program which, if supported in FY 1968 and future years, can preserve a position of leadership for the United States in aeronautics and space in the period immediately after completion of the Apollo program and in the longer term future as well. The Apollo Applications Program, Voyager, NERVA II, the advanced Applications Technology Satellites, and an expanded aeronautics program are before you as the major new programs to achieve these ends. We are here today to present the reasons for these decisions and the justifications for the programs the President has recommended to implement it.

To complete the framework for my presentation, let me summarize our budget request in relation to the present status of our authorization bill in the Congress. As indicated in the Table below, the appropriations recommended by the President in his FY 1968 Budget, as amended, total $5,100 million. Our FY 1968 authorization bill has been passed by both Houses of Congress. The total authorized in the Senate Bill is $4,851 million; the total figure in the House Bill is $4,927.2 million. We understand that the conferees are to meet this week.

NASA - FY 1968 APPROPRIATIONS
(in millions)

	FY 1968 Budget (as amended)	FY 1968 Authorizations As Passed by Senate	FY 1968 Authorizations As Passed by House
Research and Development	$4,352.0	$4,135.7	$4,212.0 [1/]
Construction of Facilities	76.7	67.1	67.0
Administrative Operations	671.3	648.2	648.2
TOTAL NASA	$5,100.0	$4,851.0	$4,927.2 [1/]

[1/] Includes 136.4 million authorized but not distributed by item in S-1296 as passed by the House.

NOTE: In addition to the amounts shown above, $60 million of funds appropriated in FY 1968 is to be applied to the FY 1968 program plan for "Research and Development."

We cannot now assess in detail the impact of the actions of the Congress of the authorization bill. The FY 1968 Budget was drawn so tightly that a reduction of even the lesser amount represented by the total in the House Bill places us in the position where we will have to work out, within the amounts available, a revised program which clearly cannot meet all the objectives of the program recommended and detailed in the Budget. This will require careful consideration of the final action of Congress and some hard decisions on our part, including actions on on-going and necessary new programs with far-reaching consequences on our future achievements, capabilities, and national position in space and aeronautics. While I am not in a position to speak to the details, it is clear that these consequences will be more damaging and less subject to

mitigation in subsequent years, to the degree that the amounts finally appropriated fall short of the President's Budget. For this reason, I strongly urge your support for FY 1968 appropriations for NASA as close as possible to the $5,100 million recommended in the President's FY 1968 Budget as amended, and my statement today will be addressed to those recommendations.

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When I appeared before you last year, I described the FY 1968 budget as a major decision point for the Nation on the future of our space and aeronautics program. I was pointing to the fact, which was already clear at that time, that we could not put off beyond this year the national decisions on how and to what extent we wish to use and build upon the capability we have built since 1958, when NASA was created and, more importantly, since the decision in 1961 to make a major effort to achieve and maintain leadership in aeronautics and space.

In the ensuing years, with the support of Congress and the nation, we have achieved much of what we set out to do in 1961. The technology necessary to achieve our immediate objectives is now in hand. Facilities necessary to design, develop, build, test, check-out and fly large space systems have been built with an investment of over $3.5 billion. And the people necessary to man these facilities and apply this technology have been hired and trained and put to work

under the management systems which had to be developed for the first time to control and direct this new kind of effort. A total of about $550 million has gone to the campuses of universities -- mostly for research, with smaller amounts for training and facilities. In addition to the value of research accomplished and the facilities and equipment that are now in place, this investment has provided a basic national asset in the form of trained and committed scientists.

Today, throughout the United States in laboratories, in contractor and subcontractor plants, in test chambers and control rooms, at launch sites and in tracking stations -- thousands of skillful, trained and dedicated men and women are at work, ready to use this massive capability as we, as a nation, decide they should. The questions now to be answered are how we should best use that capability to secure a maximum return on our national investment and to best serve our national needs.

We are on the verge of demonstrating through actual experience the existence of the capabilities we set out to create. In a few weeks the first Saturn V is scheduled to be launched as proof that the steps taken in 1958, and reaffirmed in 1961, give us the power to free large useful systems from the earth's gravity and to send them out to the moon or to Mars or to synchronous orbit where much can be learned that cannot be learned from the test tube or from Mt. Palomar.

The basic capability to which I have been referring was not established cheaply, and by its very nature it will not long exist

if left unused. Since 1958 we have invested almost $28 billion in this base. Now it is ready to produce for us. But the skilled and experienced teams, such as those working this morning at Jet Propulsion Laboratory on lunar and planetary probes, and elsewhere on Apollo, NERVA, and other projects, will break apart and disappear in the months ahead unless we put them to work on the important projects of the future they are so well qualified to undertake. As I have mentioned, we have already -- 18 months ago -- passed the peak of activity in building this capability; in terms of manpower, we have dropped from 420,000 to about 330,000, and will go below 300,000 in FY 1968. Saturn I-B and Saturn V production lines are in a period of reducing activity as we move toward a lower production rate which under our 1968 Budget request we would stabilize at four of each per year. Reductions in our budget will further slow and could stop these production lines.

I am sure that it is not necessary to remind the members of this Committee that research and development capacity is a living capability not instantly created, but unfortunately easily killed. That capacity cannot be turned on and off like a tap. If we wish to have it, and I believe we must have it if we are to survive as a major nation in a technological age, we must support it. This nation's ability to compete technologically in the modern world depends on maintaining the momentum, through use, of a strong scientific community -- particularly in universities in a

mutually supporting relation with graduate education -- and the companion strength of highly skilled industry working at the forefront of technology.

The demands on our nation's resources at home and abroad are great, and our budget request is the result of a most careful review aimed at funding the minimum program for FY 1968 which would support, and not undercut, essential national objectives and take advantage of, and not dissipate, the investment and capabilities I have been describing. The basic and far-reaching decisions which are embodied in the President's Budget are:

1. To carry the Apollo program through to completion. We cannot now state whether we will be able to meet the goal of a manned lunar landing before 1970. The decision in this budget, which is not changed by the Apollo 204 accident, is that we will press forward with Apollo and achieve the capabilities for men to operate in space which have been the goals of the Apollo program from the beginning.

2. To follow up the Apollo program, without loss of continuity, with a program to apply and further develop the capabilities developed in Apollo through continued use of the Saturn V, the Saturn IB, and the Apollo spacecraft. This is the Apollo Applications Program. One of its primary goals is to develop the capabilities for long duration manned space flight which are fundamental to the effective use of operational manned systems. With the further development,

and use and reuse in orbit, of equipment developed in the Apollo program, we believe that we can achieve mission durations of up to one year or more, and at the same time experiment with manned scientific observations from space vehicles of the Sun, the stars, and of the Earth itself which will give us unique information of scientific and practical value. We will also continue the exploration of the moon after the first Apollo landings.

3. To press forward in the further development of practical applications of our space know-how -- in meteorology, in communications, and in other earth-oriented applications, using the capabilities of the Apollo Applications program as well as those of advanced unmanned systems like the ATS-4.

4. To proceed with the next major step in the exploration of the planets, through the Voyager program, with the first objective of unmanned landings on Mars in 1973 and 1975.

5. To begin development of the NERVA II nuclear rocket engine which offers the possibility of doubling the capabilities of the Saturn V launch vehicle. This will insure that our future propulsion technology and capabilities will be equal to our future needs.

6. To increase our efforts in aeronautical research to deal effectively with emerging problems of civil as well as military aviation.

The President, in these decisions, has recognized that we as a nation should not retreat from the challenge of space after our manned lunar landing goal is achieved, but that space exploration should go

forward without interruption using our hard won space competence within the framework of the Nation's overall needs and resources.

Let me now turn to a more detailed discussion of our budget estimates for FY 1968.

Our FY 1968 budget requirements total $5,160 million. Of this, $60 million is to be met with a carry-over of funds withheld from our FY 1967 appropriations by the President as a part of the anti-inflation measures last fall. Thus, the appropriation requests before you total $5,100 million. Of that amount $4,352 million is requested for "Research and Development," funds supporting our work with industry, universities, and other government agencies. For "Administrative Operations," the appropriation that provides for the work that we do in our own facilities, and the management of the work done by contract, we are requesting $671.3 million. Our "Construction of Facilities" request for the completion and updating of the NASA physical plant is $76.7 million.

I should mention that about $4.5 billion of our total request is required for continuation and completion of programs now underway. For this reason the actions taken by the House and Senate on our authorization, although they may appear to reduce the overall NASA budget by a relatively small percentage, in fact constitute a serious threat to the continued development and utilization of our space capabilities in the next decade and beyond, for they have the effect of reducing by large percentages or eliminating the funds available for the important programs that need to be started in FY 1968.

I will now outline the programs covered under the main headings in the "Research and Development" appropriations.

Manned Space Flight

Our FY 1968 budget requirements for manned space flight in the "Research and Development" appropriation are $3,069.2 million. Of this, $60 million will be met by funds carried over from FY 1967, so our appropriation request for FY 1968 is $3,009.2 million.

The principal item is, of course, the Apollo program, for which an appropriation of $2,456.5 is included in the budget. This estimate and the supporting detail in the justification books we have submitted, were prepared before the Apollo 204 accident. We have not yet been able to develop revised estimates in comparable detail, but our analysis of the effects of the accident and the corrective measures we are taking has indicated that to a reasonable approximation, the additional costs we face to the end of FY 1968 will be offset by savings resulting from the smaller number of launches that will occur. We have, therefore, taken as one of our guidelines that we will endeavor to conduct the revised Apollo program within the amounts included in the President's Budget for FY 1968.

I will summarize our revised Apollo program plan in terms of three major elements: the unmanned flight test missions, the first manned orbital flight, and the succeeding sequence of missions leading to the lunar landing.

The first Saturn V is scheduled for launch this fall, carrying an unmanned Block I Command Module protected by the Block II, or lunar capability, heat shield. This flight test has two purposes --

first, to begin qualification of the launch vehicle, facilities, and procedures, second, to proof test the heat shield under the reentry conditions expected during return from the moon. The second Saturn V, carrying a similar payload and scheduled for this winter, will repeat the mission to qualify the launch vehicle and heat shield.

Also this fall we plan to carry out the first flight test of the lunar module. This will be an unmanned test launched by an uprated Saturn I. The test will prove the LM propulsion system in space, under environmental conditions that cannot be readily simulated in ground facilities. The Saturn 204 vehicle was not damaged in the accident of January 27, 1967, and will be used in this test.

The first manned orbital mission will use the first Block II Apollo spacecraft, which is expected to be delivered late this calendar year with all the mandatory changes resulting from the reviews of the 204 accident. The checkout period at the Kennedy Space Center will proceed in parallel with the thermal vacuum, vibration, and flammability tests of the new configuration at the Manned Spacecraft Center.

The current plan calls for this mission to be launched toward the end of the first quarter of calendar year 1968, on an uprated Saturn I.

The flight mission objectives are open-ended: after the first six orbits, individual planned decision points are reached that determine whether to terminate or continue the flights. The mission could continue for as long as ten days. In the event that the performance of the several major systems to be tested in this flight does not meet the required levels, repeats of this mission can be scheduled on available uprated Saturn I vehicles as soon as the next Block II spacecraft are delivered and checked out.

Once the objectives of verifying expected crew and spacecraft performance in earth orbit have been met, we will proceed to the next phase -- the development and verification of the flight operations that are required for lunar mission. In this phase, the Command and Service Module and the Lunar Module are operated together and separately in various modes which test the operations required in the manned lunar landing mission. This is the first opportunity for manned operations with the Lunar Module.

In the event that the Saturn V development has proceeded successfully and it is considered man-rated by the time we are ready to carry out these flights, we plan to move the Apollo effort from the uprated Saturn I to the Saturn V. This would have the benefit of developing experience with the total flight system eventually designed for the lunar landing at the earliest time possible. On the other hand, if the availability of the Saturn V is delayed for any reason, these Command and Service Module-Lunar Module operations

missions can and will be carried out on dual uprated Saturn I flights, with one vehicle placing the unmanned Lunar Module and the other the manned Command and Service Module into orbit. After the Command and Service Module has completed its rendezvous with the Lunar Module, the mission would proceed in the same manner as if it had been initially launched on the Saturn V. The flexibility of using uprated Saturn I or Saturn V vehicles to continue development flights has been and continues to be a major asset to the Apollo program in providing assurance that flight operations can continue despite problems that may occur in the launch vehicle.

The next phase will be to simulate in earth orbit the complete lunar landing and return sequence. After this has been accomplished, we will be ready to attempt actual missions to the moon.

The actual scheduling of the Apollo flight missions after the first unmanned Saturn V and the first manned Command and Service Module flights will reflect the degree of success or difficulty encountered in the conduct of each mission. Production of flight systems is being planned to take advantage of success and to provide flexibility and continued progress in the event of development problems. While the first Block II spacecraft has yet to be delivered, we feel today that we can plan on production, test, and checkout for flight availability of some five spacecraft in 1968 and up to eight more in 1969. The production and test capabilities of both industry and the government are sufficient to meet these

requirements. With eleven of the fifteen Saturn V launch vehicles in the Apollo program scheduled to be available for launch before the end of 1969, there is still some possibility that we can accomplish a manned lunar landing by the end of the decade.

I will turn now to the Apollo Applications Program, for which our FY 1968 budget estimate is $454.7 million.

The basic issue posed by the Apollo Applications Program is whether we should abandon the capability and stop the momentum we are building up in the Apollo program when the manned lunar landing has been accomplished. As I have already stated, FY 1968 is the year of decision, and the President's budget recommendation is that we, as a nation, should not call it quits after the manned lunar landing and should continue to move forward in the field of manned space flight.

The objectives of the Apollo Applications Program are dual in nature. On the one hand, its objectives are to take advantage of the developed Apollo hardware and experience to make unique contribution to practical applications, to operational capabilities, to scientific experimentation, and to technological advance. At the same time, it will provide the experience and information necessary to future decisions on the continued value, usefulness, and economics of major space flight systems. We cannot intelligently consider the full potential role of a future manned space station, or of manned planetary exploration, or of permanent research facilities in orbit without the knowledge we will gain through the Apollo Applications Program.

The important elements of the program we have planned are as follows:

First, to develop a capability for long duration flight -- our plans include development of an orbital workshop created by converting the empty orbiting second stage of an uprated Saturn I into a habitable, 10,000-cubic-foot space vehicle. This workshop would carry an airlock permitting its reuse and revisit by Apollo Command and Service Modules. By keeping each mission open-ended -- that is, by so planning flight operations as to permit the achievement of as many significant objectives as possible before returning -- we expect to achieve and demonstrate long-duration flight capabilities of up to one year or more.

Second, as the first step toward investigating man's role in space as an astronomer, we are continuing the development initiated last year of the Apollo Telescope Mount, an instrument system that will first be used for studies of the sun during the peak of solar activity. Its use will be important scientifically and will also give us necessary experience for larger telescopes in space which may be undertaken in the future.

Third, we will be building specialized payloads for meteorological and earth sensing experiments. We feel that here may be benefits whose value cannot be fully grasped at this time; only detailed repetitive experiments will teach us what trade-offs exist between

carrying out such programs on the surface of the earth or in space, and whether manned or automated space systems offer the greater return and flexibility.

Finally, we plan to work toward extending man's stay time on the moon from the present capability, which is measured in hours, to one we hope to measure in weeks. This will require a logistics approach, with the landing of supplies and shelters in advance of the exploration team, and resupply of the team once landed.

To support this Apollo Applications Program we have planned to stabilize the production rate of uprated Saturn I and Saturn V launch vehicles at an average of four of each per year. For the immediate post-Apollo period, however, the FY 1968 budget estimates are based on a stretch-out in Saturn V production under what production would drop to two per year for about two years. We face an extremely critical problem in maintaining even this production rate in the face of the reductions that are in prospect in our FY 1968 authorization bill.

Space Sciences and Applications

The FY 1968 R&D request for the space science and applications area is $694,600,000. This amount includes $20,000,000 for the sustaining university program.

In the Space Science and Applications Program we have achieved the successes of Lunar Orbiter, Surveryor, Ranger, Mariner, Pioneer, the weather and communications satellites, the Applications Technology Satellite, the Orbiting Geophysical Observatory, the Orbiting Solar Observatory, and the satellites launched for other countries in our international cooperation program.

Unless new and necessary activity is supported this year, the flight program in this area will fall off to about one-third of its present level by 1970, and there will be no projects underway for the years immediately beyond 1970. Budgetary constraints of recent years, and the phasing out of spacecraft -- like Surveyor and Orbiter -- as they achieved their objectives, will have this effect.

In the years immediately ahead we must anticipate fewer accomplishments of the type we have come to accept with regularity. This underlines the importance of positive actions in the Fiscal Year 1968 Budget to prevent our hard-won leadership in this field from slipping away.

The missions discussed below have been selected as the most important of a long list of challenging opportunities for space exploration and practical application.

Up to the present and in the immediate future, our planetary exploration has been and will be carried out by Mariner-class spacecraft, principally fly-bys. This budget requests support for Mariner Mars 1969 and Mariner Mars 1971, the latter carrying an atmospheric probe. At this point it becomes essential that further exploration be carried out by a spacecraft system designed to provide for the landing of a significant payload on the surface of the planet. Voyager provides this system.

Voyager is a major program of planetary exploration having great importance and far-reaching significance. It is designed to explore Mars and Venus with the combined orbiter-plus-lander technique used so successfully on the Moon with Lunar Orbiter and Surveyor. The first flight would be a Mars mission in 1973, employing the Saturn V launch vehicle and carrying two spacecraft. FY 1968 funds would cover the detailed design of the Voyager systems.

Planetary exploration provides a unique opportunity to get answers to fundamental questions about the evolution of the solar system. More importantly, we stand to gain a much better understanding of our own planet. By applying the techniques used to develop our present knowledge of the earth to the study of other bodies of our solar system, we will be in better position to understand the evolution, structure, and environment of our own earth. Also, laboratory studies support the theory that life could have evolved on other planets, the most likely candidate being Mars. Discovery and study of other-world life forms will provide basic insights

into the understanding of life on our own earth.

These exciting prospects have motivated scientific review boards such as the Space Science Board of the National Academy of Sciences and the President's Science Advisory Committee (PSAC) to recommend high priority for planetary exploration.

In the Physics and Astronomy Program we are proposing to undertake Sunblazer.. This relatively inexpensive family of small Scout-launched solar probes constitutes an important step in our exploration of the Sun as well as an effort to capitalize on small probe techniques for deep space exploration. Immediate initiation of flight hardware would lead to flights in 1968.

A new Applications Technology Satellite configuration is proposed to develop the technology of high-gain, precisely steerable antennas in synchronous Earth orbit. This technology will be applicable to advanced radio and television broadcast satellites, navigation and traffic control satellites, data collection and transmission satellites, and other practical uses. Fiscal Year 1968 funds will allow completion of preliminary design and initiation of detailed design. First flight would be in 1971.

Nimbus (E and F) is a follow-on procurement of upgraded Nimbus weather satellites with which to conduct research on new meteorological sensors applicable to the long range forecasting problem. There is strong support of this development because of its wide potential use.

Advanced Research and Technology

Our work in advanced research and technology supports the current aeronautical and space activities of the Nation, and, more importantly, provides the scientific and engineering base and the new technology required for future programs. The FY 1968 budget request for "Research and Development" in this area is $345,500,000.

I will confine my remarks to two fields of effort which have been given special emphasis in the FY 1968 budget -- nuclear propulsion and aeronautics.

After years of promising study, technological development, and testing in our joint program with the Atomic Energy Commission, we are now ready and propose to begin development of the NERVA II nuclear rocket. This will be a major advance in propulsion comparable to the start of development of hydrogen-oxygen engines -- the RL-10 in 1958 and the larger J-2 in 1960.

The NERVA II engine, with almost twice the specific impulse of hydrogen-oxygen engines, can be used for transporting a wide variety of possible heavy payloads into earth orbits, for landing heavy payloads on any part of the moon's surface, for unmanned solar system missions requiring high velocities, and if it is decided to do so, for manned exploration of Mars.

The technology developed by NASA jointly with the AEC over the past several years, culminating in a very successful series of breadboard engine tests last year, shows that we are ready

to begin engine development now. The time required to develop the engine - nine to ten years - means that we should start its development now if we are to have a position of leadership in space capabilities in the late 1970's and 1980's. Moreover, the technology program over the years has developed a very competent industry-government team in this specialized type of work; putting this team to work on NERVA II now will assure development of the engine in a shorter time and at a lower cost than would be the case if there is a hiatus and the team becomes dispersed.

In aeronautics, we are increasing our efforts in response to the rapidly growing national needs in transportation and the changing pattern of aeronautical research.

We have recently established a new position of Deputy Associate Administrator for Aeronautics in the Office of Advanced Research and Technology to assure that a viable research effort in aeronautics involving all the technical disciplines of our advanced research and technology program is defined and brought to bear on the critical problems in aviation as we see them today.

Five major mission categories for aeronautics with detailed objectives have been defined. These categories cover the spectrum of atmospheric flight as follows: General Aviation, Vertical and Short Take-off and Landing (V/STOL) Aircraft, Subsonic and Transonic Aircraft, Supersonic Aircraft, and Hypersonic Aircraft. Research in the technical disciplines of aerodynamics, propulsion, loads and structures, avionics, human factors, flight dynamics, and operational environment makes up the technical program for each mission or

aircraft-class category. Our program also includes work in general fields, such as flight safety and basic research in materials.

In addition to increased research effort in these important fields, we have had to include funds in our FY 1968 budget request for assuming the costs of maintaining and operating experimental aircraft in our program, such as the X-15's and the XB-70 which were previously supported by the Department of Defense. In FY 1968 this amounts to about $16 million.

Tracking and Data Acquisition

The last major area in "Research and Development" I will discuss is Tracking and Data Acquisition, for which our FY 1968 budget estimate is $297,700,000. This provides for the operation of and necessary equipment for our three networks -- the Manned Space Flight Network, the Satellite Tracking and Data Acquisition Network (STADAN), and the Deep Space Network -- and their associated communications.

The success of our flight projects, both manned and unmanned depends upon the electronic links with the earth. These links provide the information needed for proper monitoring of launch vehicle and spacecraft operations and for diagnosis of problems that occur in flight. Decisions can then be made on the ground and corrective instructions and commands transmitted to the spacecraft. In addition, the wealth of scientific data gathered by our satellites and space probes are brought back to earth over these channels. As a measure of the increasing scope of our tracking and data acquisition activities, it is interesting to note that the total months of data

from active satellites increased from 164 "satellite-months" in 1963 to 460 in 1967.

Administrative Operations

The "Administrative Operations" appropriation provides funds for the research and development done at our NASA centers; for the management of the ninety per cent of our work that is done by contract, and for the management of NASA itself. These funds pay the salaries of the people who work at all of our centers and the other operating costs of these installations. This is not merely an "overhead account." It carries the life blood of our entire operation.

Our centers and other installations have different and complementing roles in the research and development process. Each center's personnel structure and the size of its budget in the "Administrative Operations" account reflect these differences.

For example, the centers and other installations under the Associate Administrator for Manned Space Flight at Huntsville, Houston, Cape Kennedy, Michoud, the Mississippi Test Facility, and at the White Sands Proving Ground -- are engaged primarily in the development, procurement and launching of large launch vehicles and manned spacecraft systems, and their auxiliary equipment. In addition, they are responsible for the mission planning and operations during the mission and for supporting research and development in their assigned probes. These activities involve a large contractor effort which must be

directed, monitored, and coordinated by senior professional NASA personnel located at the NASA Centers, and at the contractors' plants. The support required from the "Administrative Operations" appropriation for the manned space flight program area is large in comparison to the others because of the much larger scale of the effort underway.

The pattern is somewhat different, for example, in the case of centers under the Associate Administrator for Advanced Research and Technology -- the Langley, Lewis, Ames, Electronics Research and Flight Research Centers. These centers are oriented primarily to provide the research foundation essential for all successful development programs. Their focus is on the laboratory work done at the center and on monitoring the NASA supported research efforts, in the same fields, of universities, industry, and non-profit institutions. Their requirements from the "Administrative Operations" appropriations relate primarily to their "in-house" laboratory operations.

Our FY 1968 budget estimate for "Administrative Operations" totals $671,300,000, which is $23.8 million more than our FY 1967 operating plan. The increases requested include $6.9 million at the Kennedy Space Center and $2.6 million at the Manned Spacecraft Center which reflect their heavy involvement in the Apollo program, $7 million for the Electronics Research Center, which represents the amount required in FY 1968 to continue the planned buildup of this Center and $5 million for the Langley Research Center for additional manpower required for Voyager and the aeronautics programs and for additional computer requirements. Other installations

will remain at approximately the same funding level as in FY 1967.

Construction of Facilities

The Construction of Facilties appropriation provides for contractual services for the design, construction and modification of facilities; the purchase of equipment related to construction and modification; and advance design of facilities planned for future authorization. The request for 1968 is $54.2 million, a decrease of $28.8 million from the 1967 appropriation. I will discuss only the two largest items, at this time, but we will be glad to discuss the others in detail if you wish.

One of the major items in our request this year is $22.5 million for Engine and Stage Test Stands at the Nuclear Rocket Development Station, Jackass Flats, Nevada, which are needed for the NERVA II nuclear engine development which I have already discussed. The facilities will consist of two identical test positions operating from a common control and fluid system and will be designed with the capability of testing an entire nuclear propulsion stage. The facility is presently in design and the FY 1968 request will cover further design effort and the initial phases of construction.

The other large item in our FY 1968 request is a total of $24.9 million for additional construction and modification of our launch complexes at Cape Kennedy. We need $16.7 million for Launch Complex 39, from which the Saturn V vehicle will be launched, and $5.7 million for alteration and rehabilitation work at Complexes 34 and 37, from which the Saturn I-B vehicles are launched.

We also need $2.3 million to modify Launch Complex 17 to accomodate the "long tank" version of the improved Delta launch vehicle, and $210 thousand for utility installations for the industrial area.

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Mr. Chairman, this completes my formal statement. My colleagues and I will be glad to answer any questions you may have on my statement, the budget justifications we have submitted, or any other matters of interest to you at this time.